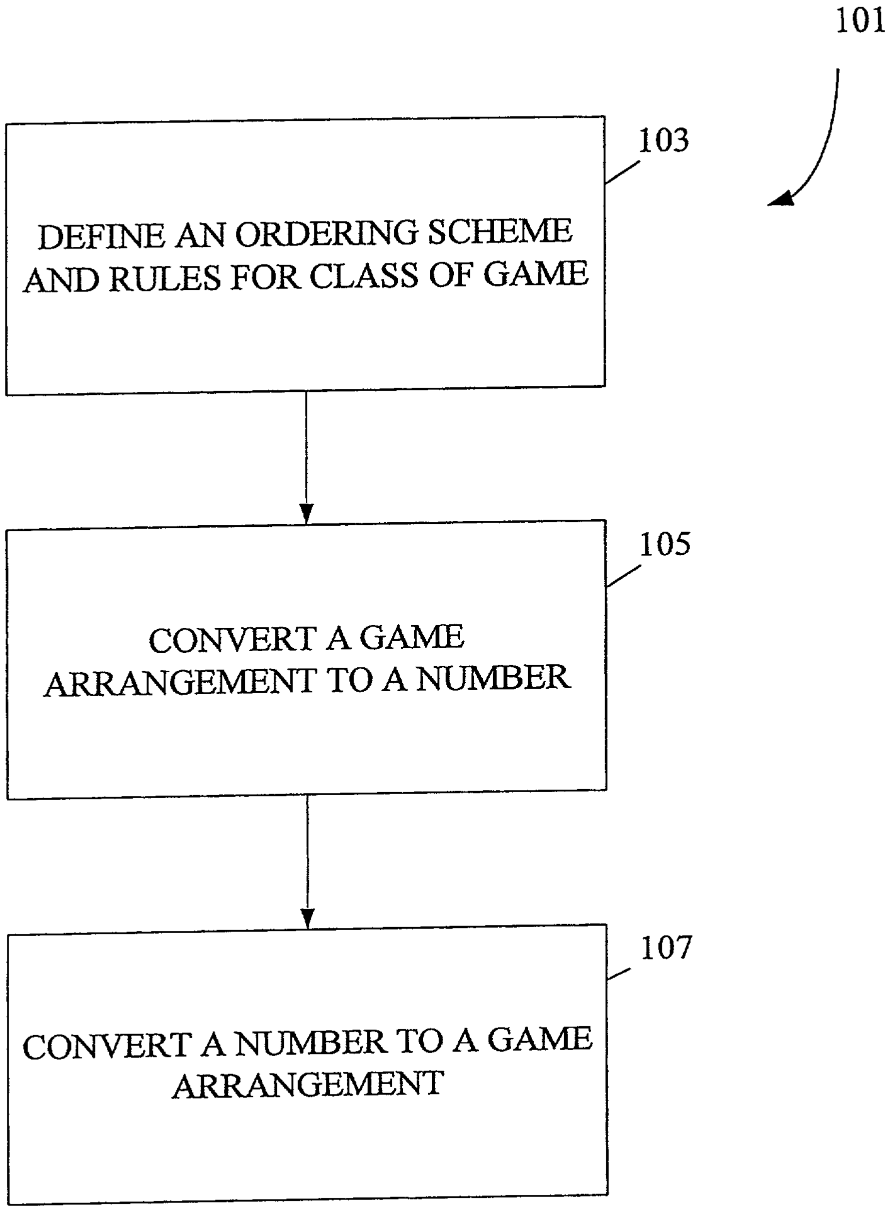

101
103
DEFINE AN ORDERING SCHEME AND RULES FOR CLASS OF GAME
105
CONVERT A GAME ARRANGEMENT TO A NUMBER
107
CONVERT A NUMBER TO A GAME ARRANGEMENT

Figure 1

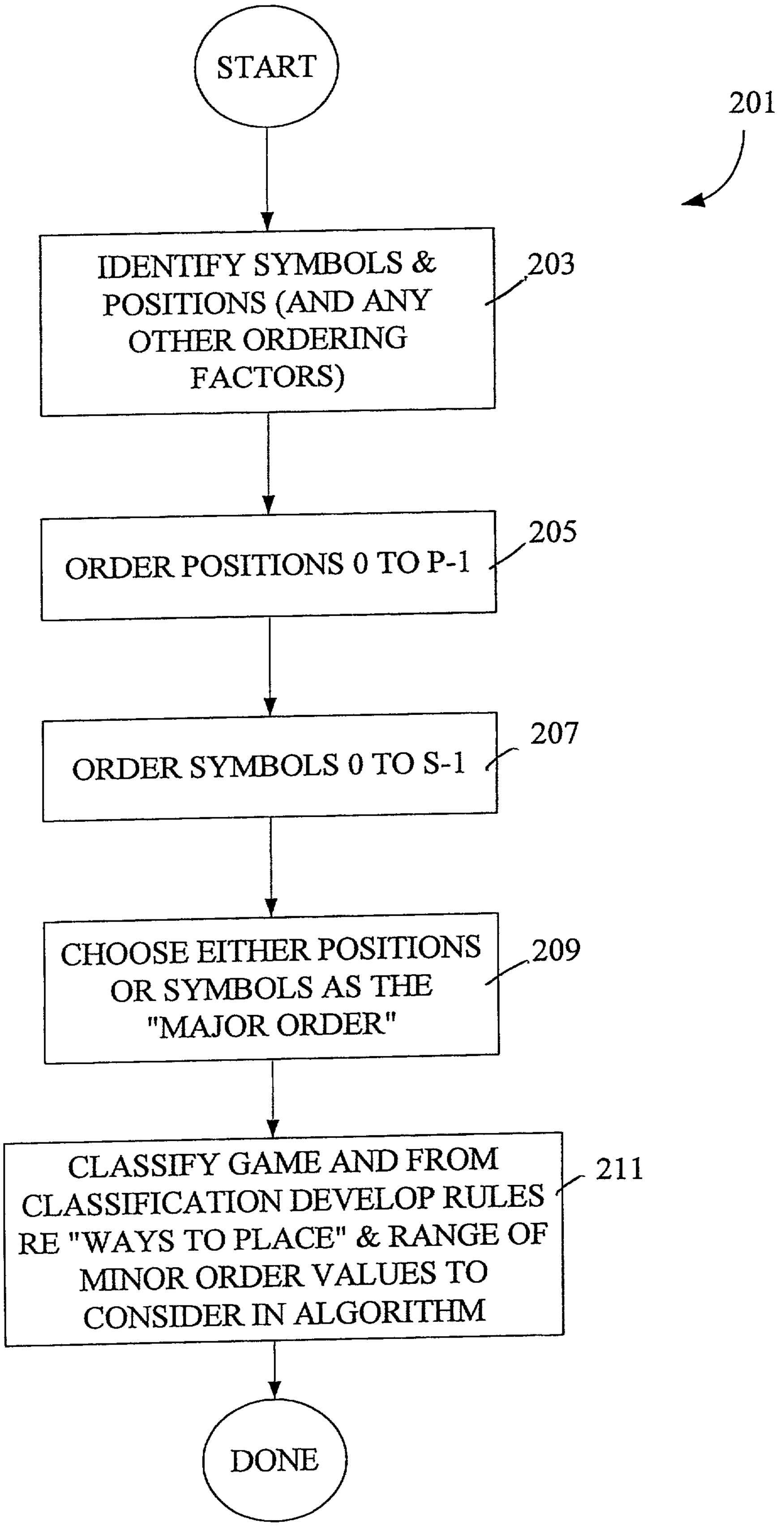

START
201
IDENTIFY SYMBOLS & POSITIONS (AND ANY OTHER ORDERING FACTORS)
203
ORDER POSITIONS 0 TO P-1
205
ORDER SYMBOLS 0 TO S-1
207
CHOOSE EITHER POSITIONS OR SYMBOLS AS THE "MAJOR ORDER"
209
CLASSIFY GAME AND FROM CLASSIFICATION DEVELOP RULES RE "WAYS TO PLACE" & RANGE OF MINOR ORDER VALUES TO CONSIDER IN ALGORITHM
211
DONE

Figure 2

2h	3h	4h	5h	6h
2h	3h	4h	5h	7h
2h	3h	4h	5h	8h
		.		
		.		
		.		
2h	3h	4h	5h	Ah
2h	3h	4h	6h	7h
2h	3h	4h	6h	8h
		.		
		.		
		.		
3h	4h	5h	6h	7h
3h	4h	5h	6h	8h
		.		
		.		
		.		
9s	10s	Js	Qs	Ks
9s	10s	Js	Qs	As
		.		
		.		
		.		
10s	Js	Qs	Ks	As

Figure 3

Symbols as Major Order (Two Dice)

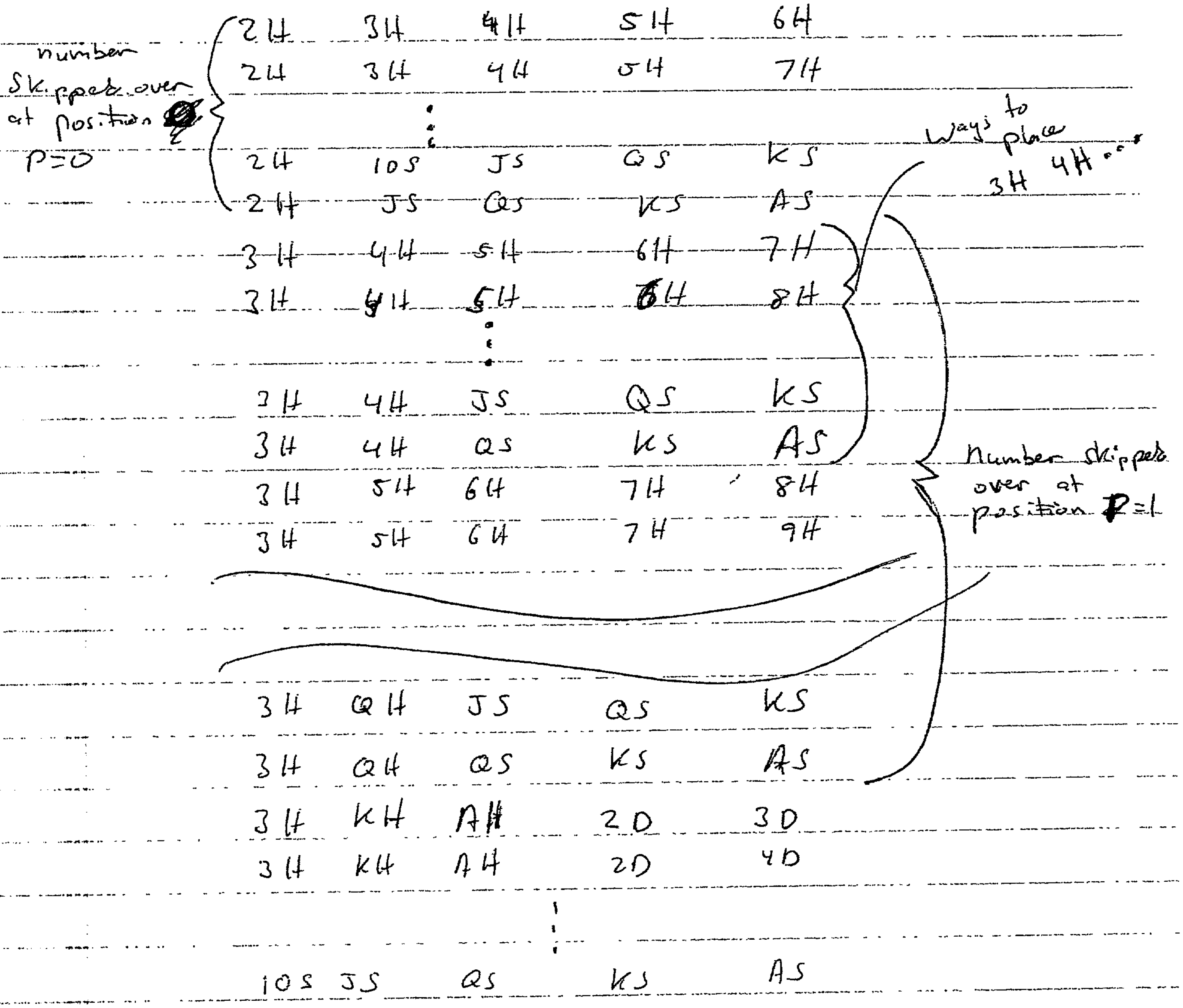
11	41	23	26	53	46
12	15	32	62	36	64
21	51	24	33	63	55
13	16	42	34	44	56
31	61	25	43	45	65
14	22	52	35	54	66

Position as Major Order (Two Dice)

11	21	31	41	51	61
12	22	32	42	52	62
13	23	33	43	53	63
14	24	34	44	54	64
15	25	35	45	55	65
16	26	36	46	56	66

Figure 4

Poker hand under Consideration 3H KH 2D 7C 4S



2H	3H	4H	5H	6H
2H	3H	4H	5H	7H
	⋮			
2H	10S	JS	QS	KS
2H	JS	QS	KS	AS
3H	4H	5H	6H	7H
3H	4H	5H	6H	8H
		⋮		
3H	4H	JS	QS	KS
3H	4H	QS	KS	AS
3H	5H	6H	7H	8H
3H	5H	6H	7H	9H
3H	QH	JS	QS	KS
3H	QH	QS	KS	AS
3H	KH	AH	2D	3D
3H	KH	AH	2D	4D
		⋮		
10S	JS	QS	KS	AS

Figure 5

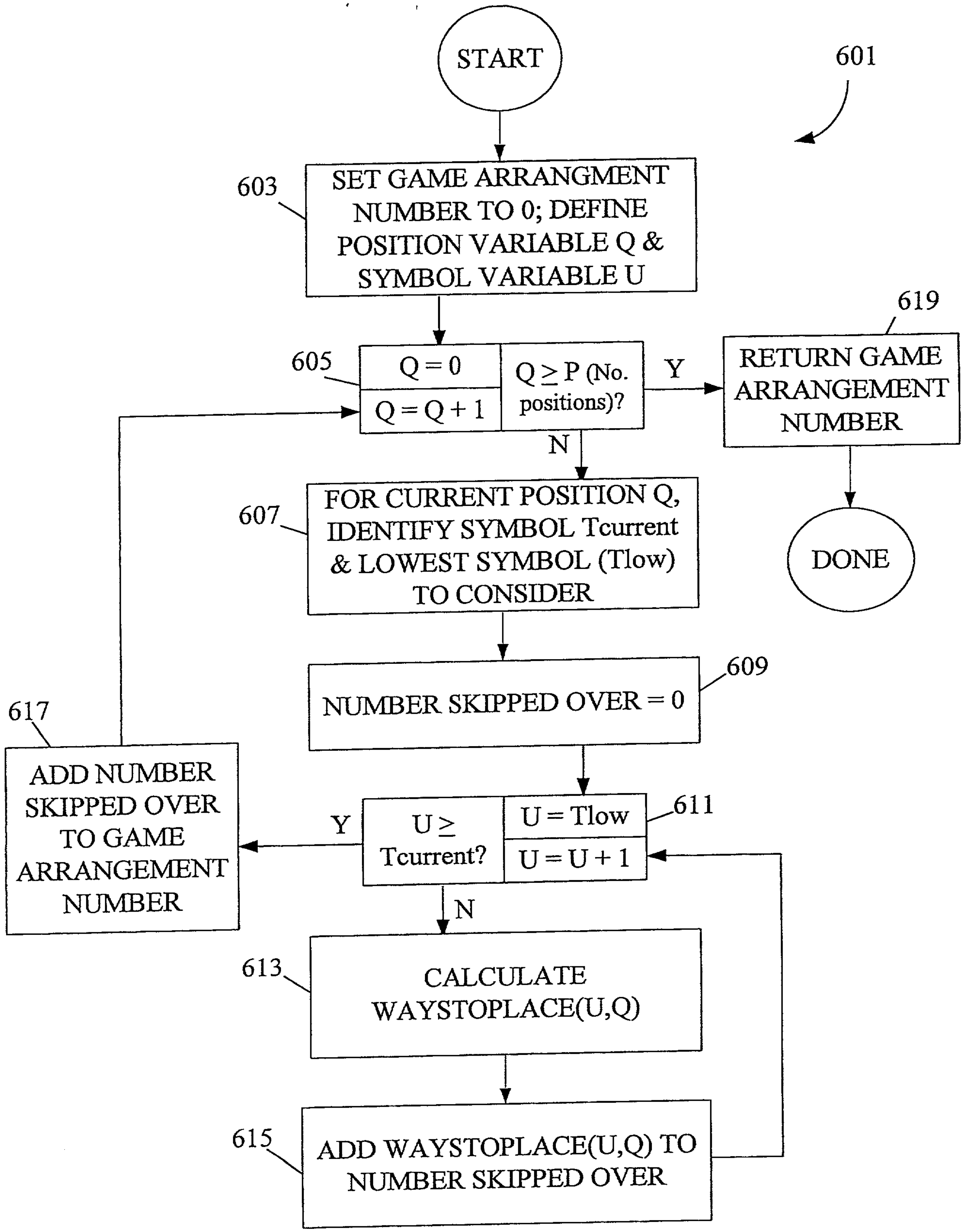

START
601
603
SET GAME ARRANGMENT NUMBER TO 0; DEFINE POSITION VARIABLE Q & SYMBOL VARIABLE U
605
Q = 0
Q = Q + 1
Q ≥ P (No. positions)?
Y
N
619
RETURN GAME ARRANGEMENT NUMBER
DONE
607
FOR CURRENT POSITION Q, IDENTIFY SYMBOL Tcurrent & LOWEST SYMBOL (Tlow) TO CONSIDER
609
NUMBER SKIPPED OVER = 0
617
ADD NUMBER SKIPPED OVER TO GAME ARRANGEMENT NUMBER
Y
U ≥ Tcurrent?
611
U = Tlow
U = U + 1
N
613
CALCULATE WAYSTOPLACE(U,Q)
615
ADD WAYSTOPLACE(U,Q) TO NUMBER SKIPPED OVER

Figure 6

Convert KH, 7C, 4S, 8D, 3H, to a number

Order the cards! → 3H, KH, 8D, 7C, 4S

Start w/ # = 0
position Q = 0
symbol T = 1 (3H) 3H – – –
V = 0 (2H)
compute # of ways to have 2H – – – – – (choose $\binom{52-0-1}{5-0-1}$)
= 249,900
= 0 + 249,900 = 249,900
Position Q = 1, symbol $T_{current}$ = 11 $\overset{3H}{t_{now} = 4H}$ KH – – –
V = 2 (4H)
Compute # of ways to Place 3H 4H – – –
= 18,424
# = 249,900 + 18,424 = 268,324
V = 3 (5H)
Compute ways to Place (3H 5H – – –) = 17,296
# = 268,324 + 17,296 = 285,620
V = 4 (6H)
Compute ways To Place (3H 6H – – –) = 16,215
~~#~~ # = # + 16,215 = 301,835
V = 5 (7H)
Compute ways to Place (3H 7H – – –) = 15180
# = # + 15180 = 317,015
V = 6 (8H)
Compute ways to Place (3H 8H – – –) = 14,190
# = # + 14,190 = 331,205
V = 7 (9H)
Compute ways to Place (3H 9H – – –) = 13,244
# = # + 13,244 = 344,449
V = 8 (10H)
Compute ways To Place (3H 10H – – –) = 12,341
= # + 12,341 = 356,790

Figure 7

over →

V=9 (JH)
compute waysToPlace (3H JH - - -) = 11,480
#=#+11,480=368,220
V=10 (QH)
compute waysToPlace (3H QH - -) = 10,660
# = # + 10,660 = 378,930
V=11 (KH) This is our symbol T, being
considered. Stop the B.Z. loop &
go to the next position.
Position Q=2, symbol T=19 (8D)

---

by placing this card
skipped over by 3H (i.e. pos. 0)
= ways to place (2H - - - -)

placing this card
skipped over by 3H KH - - -
= ways to Place (3H 4H - - -)
+ ways to Place (3H 5H - - -)
+ (3H 6H - - -)
+ (3H 7H - - -)
+ (3H 8H - - -)
+ (3H 9H - - -)
+ (3H 10H - - -)
+ (3H QH - - -)

skipped over by (3H KH 8D . -)
= ways to place (3H KH AH . . .)
+ " 3H KH 2D
+ " 3H KH 3D
+ " 3H KH 4D
⋮
+ " 7D

Figure 7
(Continued)

	Position Dependent	Position Independent
with Replacement	$\exp(X, Y)$ $0 \leq U < T_{curr}$ $T_{low} = 0$	$C(X, Y)$ $T_{prev} \leq U < T_{curr}$ $T_{low} = T_{prev}$
without Replacement	$P(X, Y)$ $0 \leq U < T_{curr}$ (excluding previously used values) $T_{low} = 0$	$C(X, Y)$ $T_{prev} < U < T_{curr}$ $T_{low} = T_{prev} + 1$

Figure 8

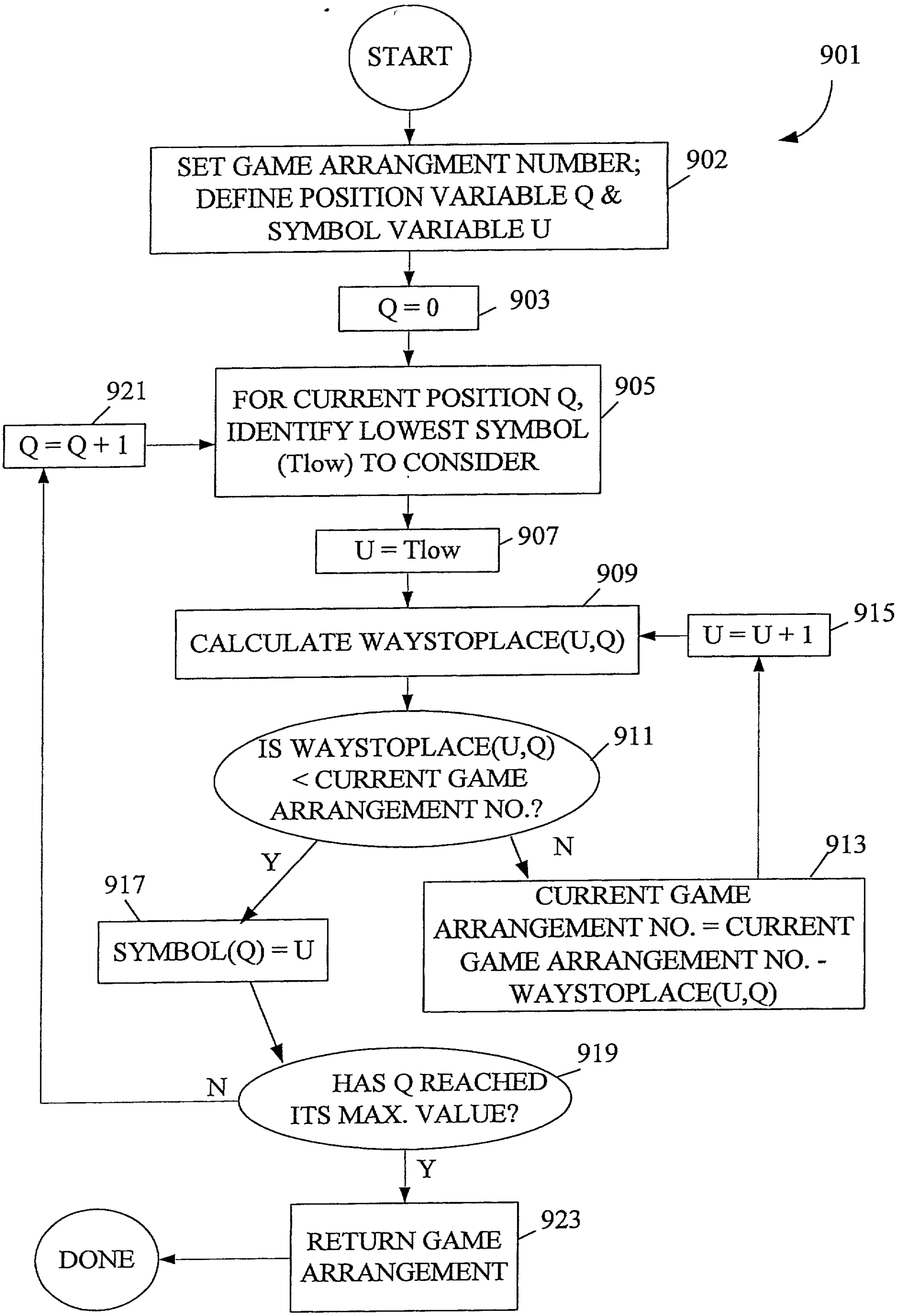

START
901
SET GAME ARRANGMENT NUMBER; DEFINE POSITION VARIABLE Q & SYMBOL VARIABLE U
902
Q = 0
903
921
Q = Q + 1
FOR CURRENT POSITION Q, IDENTIFY LOWEST SYMBOL (Tlow) TO CONSIDER
905
U = Tlow
907
909
CALCULATE WAYSTOPLACE(U,Q)
U = U + 1
915
IS WAYSTOPLACE(U,Q) < CURRENT GAME ARRANGEMENT NO.?
911
Y
N
913
917
SYMBOL(Q) = U
CURRENT GAME ARRANGEMENT NO. = CURRENT GAME ARRANGEMENT NO. - WAYSTOPLACE(U,Q)
N
HAS Q REACHED ITS MAX. VALUE?
919
Y
RETURN GAME ARRANGEMENT
923
DONE

Figure 9

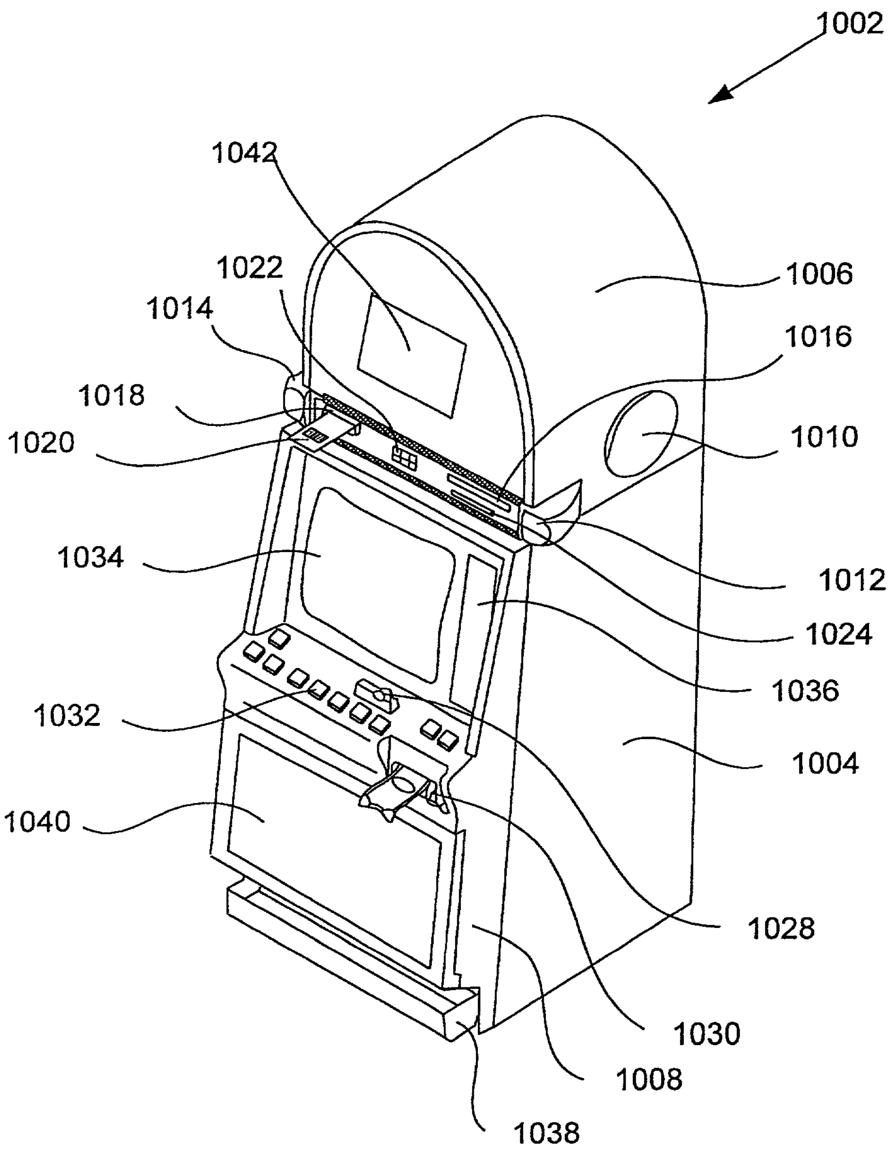
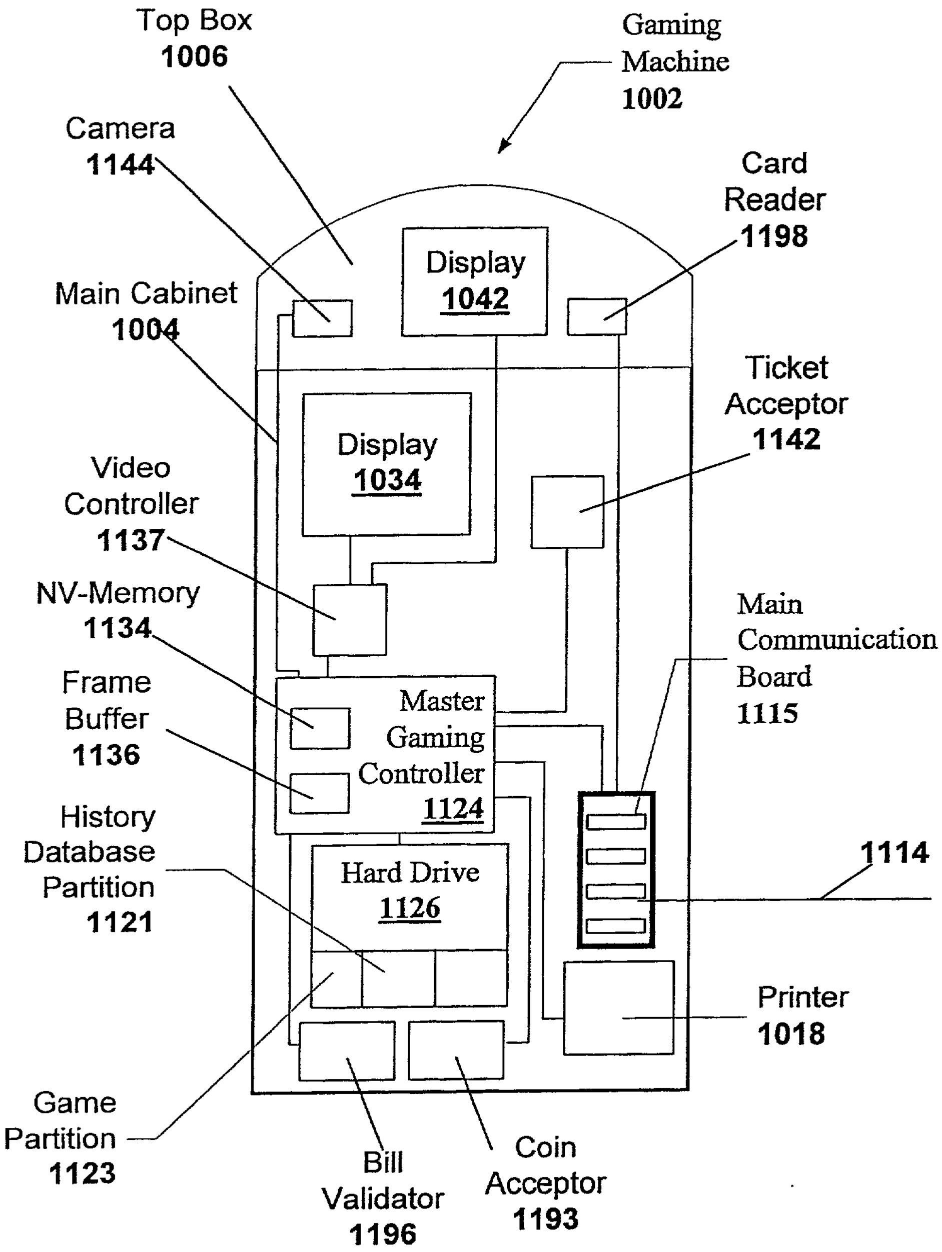

1002
1042
1006
1022
1014
1016
1018
1010
1020
1034
1012
1024
1036
1032
1004
1040
1028
1030
1008
1038

Figure 10

Figure 11


Top Box 1006
Gaming Machine 1002
Camera 1144
Card Reader 1198
Display 1042
Main Cabinet 1004
Ticket Acceptor 1142
Display 1034
Video Controller 1137
NV-Memory 1134
Main Communication Board 1115
Frame Buffer 1136
Master Gaming Controller 1124
History Database Partition 1121
Hard Drive 1126
1114
Printer 1018
Game Partition 1123
Bill Validator 1196
Coin Acceptor 1193